

## **NANOSCALE HETEROJUNCTIONS AND METHODS OF MAKING AND USING THEREOF**

### **ABSTRACT**

Disclosed herein are nanoscale heterojunctions and methods of making and using thereof. The heterojunctions comprise at least one carbon nanotube with at least one nanostructure such as a quantum dot connected, immobilized, attached, or affixed thereto. The carbon nanotubes may be single walled, multi-walled, or a combination of both. The nanostructure is preferably a quantum dot such as a ZnS capped CdSe core. The carbon nanotube heterojunctions may be employed in various nanoscale electronics and optoelectronic devices and multilayered systems including light emitting diodes, single electron transistors, spintronic devices, field emission flat panel displays, vacuum microelectronic sources, biosensors, random access memories, spin valves, and the like.